

# The Dynamics of Women's Participation and Support System in a Community Watershed Project

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**ABSTRACT—** *Community watershed project provided the platform for women's participation and enhancement of their socio-economic condition. With improvements in the biophysical condition of the village, women's livelihood improved. Watershed activities impacted women's access to resources and expanded their choices due to training and exposure that allowed for building on women's skills and hands-on experience in the management of resources. Enhancement of social networks and institutional links proved important for maintaining livelihoods and availing new opportunities for collective action and other economic prospects. To harness community involvement especially of women, the institutional architecture of research for development (R4D) initiatives like community watersheds should work to minimize gender asymmetry through capacity building with service complementation, strong social preparation to minimize over dependency, deliberate strategies for spill overs of innovations.*

**Keywords—** Women's participation, community watersheds, support system, social networks, capacity building and spill over

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## 1. INTRODUCTION

Community watershed is a major program of the Government of India through the Ministry of Rural Development and Ministry of Agriculture. Non-government organizations have also contributed in the development of watersheds. Modalities of watershed project evolved over time (Mula et al. 2007) with an understanding of rainfall behavior and conducting trials in experimental stations in 1930s, improvements in natural resource management as a result of water harvesting and conservation in 1970s-1980s, increasing crop productivity in the late 1980s, holistic perspective that included structure and issues of participation and livelihoods in 1990s, and enhancement of the holistic perspective and capacity building of locals as key areas in the 2000s. The latter made a huge difference in the implementation of watershed projects in India.

In 2000, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) adopted the Adarsha watershed (referred to as Kothapally watershed in this paper) located in Kothapally village in Ranga Reddy district, Andhra Pradesh, India for demonstrating the benefits of matured technologies in soil & water management on-station for the last 35 years. The village covers 465 hectares of which 430 hectares are cultivated lands and 35 hectares as wasteland. The Kothapally watershed is characterized by an undulating topography with an average slope of about 2.5%. Soils are predominantly Vertisols (90%) with soil depth of about 30-90 cm and has medium to low water holding capacity. Its total population consists of 200 households with an average farm size of 2.5 acres (Wani et al., 2004).

The transformation of the watershed community is largely attributed with the improved management of the resource-base (Wani et al., 2003). The major interventions to enhance productivity and income in Kothapally watershed include: soil and water conservation with the use of tractor for broad-bed and furrow land form and contour planting; wasteland development and tree plantation; integrated disease and pest management; integrated nutrient management; in situ generation of N rich green manure; vermicomposting; and capacity building to hasten uptake. These brought significant impacts in the biophysical situation (increased water levels of bore wells & minimized run-off) with corresponding improvements in farm activities (crop diversification & crop intensification) which resulted in the improvement of socio-economic situation of farm households.

The Kothapally watershed became a beacon of hope in India including dry land areas of Asia (China, Thailand, Vietnam and Philippines) and Africa. Across watershed sites in India, improved systems like physical structures (check

dams & percolation tanks), cropping and livestock integration, improved institutional arrangements were widespread. The latter is critical in watershed management as a means to understand the dynamics of the biophysical change with the social environment specifically support system of households. Promise of success is anticipated when there is a good mix of local organizations through which people can participate and strong informal relations.

This research focuses on the dynamics of women's participation in Kothapally watershed. Bantilan and Padmaja et al. (2008) reported that the extent of women's participation is hinged by the availability of resources and the provision for choices when new knowledge emerges. Women are also known to have resilience and adaptive skills in situations of interlocking constraints. Empirical evidences show women's tenacity in responding to adverse situations like disasters (Barnett 1992; Mula et. al 2000; and Carvajal-Escobar et al. 2008) to fulfill both domestic responsibilities and securing households' livelihood.

While assessing the different interventions, their impact to women specifically on socio-economic aspect of households; sustainability of improvements; and factors that contributed to the continuity and discontinuity of interventions are unraveled and discussed in this paper.

## **2. METHODOLOGY**

Six case studies, three focus group discussions (FGDs) and interviews of 102 respondents were the means of gathering information in this study conducted in 2011 with some follow-ups and validation of information in 2012. Pre-testing and post interview were conducted by enumerators and the primary researcher to ensure reliability.

Pathak et al. (2004) documented the biophysical indicators for assessing watershed-based technologies which include reduction in run-off (i.e. from 293 mm/yr to 140 mm/yr in Lalatora India), increased water level in well (< 3m for post rainy season), changed farming system (from monocropping to intercropping with sorghum, black gram, and pigeonpea in Kothapally), and decreased in cultivated area for water-loving crops (i.e. cotton by 61% and replacement of paddy with sorghum). These are relevant data sets for disclosing impact. Wani et al. 2003 reported that increased crop productivity improved family incomes. These kinds of impact of impact need to be translated in forms which could provide inferences not only in project performance but also in the depth of their contributions to households, which are discussed in this study.

## **3. OBJECTIVES**

The primary question of this study is: what has become of the Kothapally community after almost a decade of the various watershed interventions? Specific objectives were to:

- Provide an overview of the interventions made through accounts and perceptions of respondents.
- Establish the relation of the improved biophysical situation with claims of improved socio-economic condition (better participation of women and livelihood opportunities), identification of constraints and drivers of participation, and factors that contributed to the continuity or discontinuity of interventions.
- Draw insights from these experiences for better project planning. Insights on ways to encourage participation and involvement of women including social networks and inter- and intra-household dynamics.

## **4. RESULTS AND DISCUSSIONS**

### **4.1 Socio-Demographic Characteristics of Women-Respondents**

Respondents and their spouses' ages ranged from 25-45. All have experienced formal education with the majority reaching 6-10th standard. In the FGD discussions, women and the younger age group are keen to take calculated risks when support is guaranteed (in this case ICRISAT). This explains the high participation of women in livelihood options. Interview of key informants has it that ICRISAT is heavily relied upon on agriculture and matters like health & sanitation.

Children's ages ranged from 10-24 with most in various educational levels. Respondents put high regard on children's education. On household's composition, it is customary for the male's parents to be part of his own household.

### **4.2 Dynamics of Women's Participation**

As gleaned from respondents' involvement in domestic, agriculture and in own self-help group SHG cells, women are in 'double burden situation', which is critical in determining their participation to interventions. Boserup's (1970) reported that women have not been only held back by their dual participation but also with their economic exclusion where their domestic activities have not been recognized. The insights generated on time used in domestic and agricultural production discloses extent of women's participation to watershed interventions.

Women approximately used eight hours/day to fulfill major household chores of cooking, washing & cleaning, child rearing, and fetching water with intermittent activities (i.e. mending and/or stitching clothes) necessary for the proper functioning of the household. Two hours/day is used for each of the major domestic activities with almost three hours/day for fetching domestic water. Even if all these chores are not performed daily, this suggests women being overburdened with domestic and agricultural activities. Results of the case studies corroborate with the survey results.

Women's participation in crop production commences during planting till marketing. In summer, farm work starts at daybreak till noon, whole day in winter, and intermittent work during rainy season. Planting and weeding are fully participated in and regarded as the most arduous tasks. Feeding livestock and marketing of produce are regarded as slightly difficult tasks.

Even if farm operations are dictated by the agricultural calendar, there is the immense role of women in agriculture. The seasonality of agriculture does not even contribute for some 'breathing space' for women. The case studies draw the same conclusion especially households with less resources.

Membership to self-help groups (SHGs) is regarded as very important for social support system. Eighty per cent of the respondents are members of SHGs. A few hold leadership positions while others are members to state-organized societies called Development of Women and Children in Rural Areas (DWACRA).

### 4.3 Respondents' Awareness and Participation

Awareness and access to interventions determine participation. As Massiah (1980) reported, the lack of information has been one of the most cited obstacles of women's exclusion in development works. Results show that respondents were not fully aware of the various watershed interventions. There were diverse responses on the significance of these interventions to households and communities. The top three interventions participated in are: check dams, vermicomposting, and provision of seeds/planting materials (see Table 1).

**Table 1:** Assessment of ICRISAT-led interventions availed of by women-respondents (N=102)

Intervention	f	per cent
<b>1. Check Dam</b>	<b>n=42</b>	<b>41</b>
<i>a. Direct benefit</i>		
- More water in bore wells	32	67
- Soil moisture improved	2	5
- Source of paid labour	6	14
- Reduced soil erosion	4	10
<i>b. Community benefit</i>		
- More water in bore wells	37	88
- Soil moisture improved	39	93
- Source of paid labour	2	5
- Reduced soil erosion	4	10
<i>c. Contribution to intervention</i>		
- Contributed in maintenance	4	10
<i>d. Problems &amp; issues</i>		
- Difficult to ask help from others	16	38
- Less rainfall	3	7
<i>e. Date of implementation &amp; status</i>		
- Started in 2000-2001	1	2
- Started in 2004- continuing	40	95
- Started in 2005	1	2
<i>f. Suggestions for better implementation</i>		
- Requires ICRISAT help in maintenance	18	43
<b>2. Vermicomposting</b>	<b>n=33</b>	<b>32</b>
<i>a. Direct benefit</i>		
- Source of cash	12	36
- Improved crop growth	2	6
- Source of paid labour	1	3

<b>b. Community benefit</b>		
- Improved soil fertility & yield	16	48
- Reduced commercial fertilizer	6	18
<b>c. Own contribution to intervention</b>		
- Maintenance thru own labour	12	16
- Give training	3	9
<b>Intervention</b>	<b>f</b>	<b>per cent</b>
<b>d. Problems &amp; issues</b>		
- Lack of water	12	36
- Marketing of the compost	5	15
<b>e. Date of implementation &amp; status</b>		
- 2001	5	12
- 2003- continuing	11	33
<b>f. Suggestions for better implementation</b>		
- Requires ICRISAT training and marketing	11	33
<b>3. Seeds &amp; Seed Management</b>	<b>n=25</b>	<b>25</b>
<b>a. Direct benefit</b>		
- Improved yield & income	12	48
<b>b. Community benefit</b>		
- Improved soil fertility	6	24
<b>c. Contribution to intervention</b>		
- Agreed to introduce in own farm	3	33
<b>d. Problems &amp; issues</b>		
- Lack of awareness	2	12
<b>e. Date of implementation and status</b>		
- 2004 - continuing		
<b>f. Suggestions for better implementation</b>		
- Require technical help from ICRISAT	20	80
<b>4. Nursery</b>	<b>n=17</b>	<b>17</b>
<b>a. Direct benefit</b>		
- Little cash	3	18
<b>b. Community benefit</b>		
<b>c. Contribution to intervention</b>		
<b>d. Problems &amp; issues</b>		
- Lack of water	12	71
- Training	5	29
<b>e. Date of implementation &amp; status</b>		
- 2002-2003	6	35
- 2004 then stopped	2	12
<b>Intervention</b>	<b>f</b>	<b>per cent</b>
<b>f. Suggestions for better implementation</b>		
- Requires water & help in marketing	13	76
<b>5. Tropiculcator</b>	<b>n= 9</b>	<b>9</b>
<b>a. Direct benefit</b>		
- Less time and labour	6	67
- Better growth & yield	7	78
<b>b. Community benefit</b>		

<b>c. Own contribution to intervention</b>		
- Agree to try in own farm	3	33
<b>d. Problems &amp; issues</b>		
<b>e. Date of implementation &amp; status</b>		
- +1999-2000	7	78
<b>f. Suggestions for better implementation</b>		

More than 50% of those who were aware of check dams regarded as ‘not important’ for their households but ‘extremely important’ for the community. For vermicomposting, there was variation in perception because only a few are recipients. There was high importance on seeds/planting materials intervention for the household and community. This holds true with nursery establishment where it might not be extremely important but has role in securing households’ livelihood.

The nursery was implemented by 11 women members in 2005. A 0.4 hectare nursery with rental fee of US\$ 22.22 was used to grow *Pongamia* and *Jatropha* saplings. Members worked 89 person days in 6 months with an income of US\$ 1562 from saplings supplied to the government of Andhra Pradesh (GoAP). The nursery project was discontinued in the succeeding years because the government stopped buying the seedlings. This is one clear case for the need to understand the entire chain of production from the pre-, main to post-production including marketing and utilization.

Findings of Kuppannan et al. (2009) on the assessment of watershed activities in India revealed satisfactory participation of stakeholders. However, the optimal level has yet to be achieved. There is the recommendation for the convergence of various rural development programs to promote holistic development, which is apparently a key issue in Kothapally as respondents repeatedly mention that ICRISAT needs to continue its support.

A key factor that determines respondents’ full participation to various interventions is the direct and indirect benefits. Check dam is the top most intervention availed because of soil moisture retention. Those benefited (67%) mentioned observations of increased water in bore wells, significant improvement in soil moisture of farms, reduction in soil erosion and 14% benefited from paid labor during construction. Half of the 32 respondents shared the sentiment of difficulty in requesting community’s help in their maintenance.

Bhagyamma’s household is one of the most well-offs where she employs labor for her 6.5 hectares. The check dam built near her farm allowed crop diversification using pigeonpea and maize aside from significant water increment in her bore well that made cultivation of crops the whole year round. In the past four years, cotton was grown in 3.2, maize in 2.0, and paddy in 1.2 hectares during *kharif* season while in *rabi* season, due to improved irrigation, maize and paddy area was planted with 2-3 types of vegetables depending on the market forecast obtained from co-farmers and traders.

She observed improvement with her farm productivity and incomes never realized before (maize, US\$ 475; cotton, US\$ 514; and pigeonpea, US\$ 250). Her maize yield increased to 3500 kg from 1800 kg. The income from pigeonpea was an additional benefit not only as food but as a nitrogen fixing crop to improve soil fertility. The cost-benefit ratio of maize intercropped with pigeonpea is US\$ 0.73 and US\$ 1.69 for pigeonpea per hectare (see Table 2). Bhagyamma attributed good yield to ICRISAT pigeonpea seeds, technical advice, tropicultor and the check dam.

Twelve women who availed of vermicomposting found this to be a good source of cash. The quarterly income of one case is estimated at US\$ 80. Women considered this as important enhancer to their livelihood security. Those who applied vermicompost on their vegetable gardens reduced the use of commercial fertilizers and observed better yield. Women’s contribution to vermicomposting includes own labor and as resource persons in ICRISAT training. Two constraints of this intervention were difficulty in bringing water (36%) and absence of other markets (15%). There were those who started in 2004 and ended the venture after 1–2 years. Stoppage was due to lack of water to maintain moisture, including upkeep of the structure as this was far from settlement. This infers the need for stronger doze of sensitization among users to take responsibility in order to maximize benefits. Respondents’ expression of ICRISAT providing continued support suggests enhancement in social preparation for taking responsibility. Likewise, provision for livelihoods must also include viable links to markets to guarantee success.

Providing access to viable seeds juxtapose with good management enabled better yield and income (36%). This is validated by the case studies. Those who heeded with ICRISAT technical advice such as the use of good seeds, intercropping, and rotation of legumes (i.e. pigeon pea) observed improved soil fertility (24%). Only three practiced good seed management, in spite of its introduction in 2004. Technical assistance was regarded important. Crop advisory is one area requiring continuous support due to the dynamic nature of seed research & development like hybrids that should be in sync with climate variabilities.

The hype on energy crops (where ICRISAT is no exception) led the women to engage in *Pongamia* and *Jatropha* nursery. With support from ICRISAT, women came together and put up the nursery in 2005. This lasted only for three years. Tree saplings were bought by ICRISAT and the local GoAP. Three women (18%) of the 17 who participated in the nursery eked little cash. Eleven of the 17 who initially engaged in nursery completely ceased. The lack of water led to the discontinuity of the nursery and was exacerbated by the lack of market.

Six of the nine respondents who availed of the tropicultor farm implement benefited from time and labor cost saved and better growth and yield of crops. Other interventions namely biowash, technical advice (crop intensification and rotation), and percolation tanks had poor adoption. Accordingly, these were not worth their time and investment for maintenance.

**Table 2:** Mean income of women-respondents, women-respondents' husband, and joint total income in Kothapally

Age	Wife Primary Income		Wife Secondary Income		Women Total Income		Husband Primary Income		Husband Secondary Income		Husband Total Income		Total Income	
		(Rs)		(Rs)		(Rs)		(Rs)		(Rs)		(Rs)		(Rs)
All	0.4203	10581	0.3352	6041	0.6928	13571	0.2304	18817	0.3659	8051	0.8198	22194	0.3637	39160
<25	0.0795*	7133	0.4885	5100	0.2532	10533	0.0649*	10600	0.1581	8444	0.0528*	15667	0.002***	40800
25-45	0.0585*	10075	0.6901	5833	0.5400	12717	0.0424**	18765	0.1150	6947	0.7598	21459	0.0757	40238
>45	0.0957	13113	0.9648	7000	0.5961	16500	0.05817	23155	0.2735	9636	0.0957*	26810	0.0914*	35785

\* Means value is significant at 10% level of significance

\*\* Means value is significant at 5% level of significance

\*\*\* Means value is significant at 1% level of significance

Crop intensification and rotation was linked with seed and seed management. Respondents who practiced crop intensification due to improved water availability and advice on crop rotation reported significant benefit in yield and reduction in pests' incidence. A case respondent reported that crop rotation gave good returns with benefit-cost ratio of US\$ 1.56 for paddy, US\$ 2.52 for cucumber, and US\$ 0.18 for tomato (see Table 2). According to adopters, if only the entire village practices crop rotation, pest infestation will be significantly minimized. In view of this, ICRISAT's role is still regarded as 'important' to empower others through continuous technical advice. Percolation tank was the least of the interventions participated in even if this together with check dams contribute to soil recharging.

The over-all assessment of interventions' contribution to alleviation of women-respondents' quality of life revealed positive views (51%). Improved quality of life means:

- Agricultural productivity improved (31%) like pigeon pea (red gram) yield increased from 4 to 8 bags per 0.4 hectare and this gave good income; tropicultor improved the productivity of farms; and increased income by two-folds as revealed by the case studies.
- The mean value on women-respondents' income from primary source was significant among those with ages of < 25 and 25-45 range (see Table 3). For their husbands, the mean value was also significant in age group < 25 and at age range 25-45. A similar trend is shown in total income. A higher mean value for respondents, their husbands, and total income implies a meaningful improvement in the agricultural activities. The case studies describe the improvements in agricultural activities, which are the major sources of income (78% women-respondents and 65% women-respondents' husbands). Another implication drawn from the income data on total income shows that age range of < 25 to 45 years is the peak of productivity of an individual (see Table 3).
- Savings from agriculture were made possible (18%). This provided for the improvement of house structures and opportunities for investment (establishing a small retail shop).

- Income from vermicomposting helped meet daily needs like food and school fees (9%) of households.
- Interventions on infrastructure provided opportunities for wage labor (7%)

Those with no comments is explained by their indirect participation to interventions since they are wage laborers, or are occupied with domestic responsibilities, and disinterested. A follow-up on the lack of interest and no response to the query led to important revelations like: ‘Vermicomposting and nursery management are good household enterprises for us. However, when market and insufficient water become issues, we do not like to compound our situation since there are other problems we need to grapple with.’ There were expressions of participation but comments like we need ICRISAT’s assistance in training, repair of the vermicompost shed, more check dams to be built, etc. indicate weaknesses in the phasing-out stage of the project.

**Table 3:** Benefit-cost analysis of various crops grown by women-respondents in Kothapally and Urella villages

Resp No	Area	Qty Of Seed Used	Yield (Kg/ha)	Price /Kg	Gross Income (Rs/ha) (a)	Cost Of Production (Rupees/Hectare)								Total Prod'n Cost (b)	Net Income (a-b)
						Seed Cost	Sow'g	Culti'n	Fert'ze	Pest'de	Weed'g	Harvst'g	Thresh'g		
<b>1. Cotton</b>															
Farmer 1	0.4	1	1750	30	52500	1875	450	4500	6250	4125	4500	7500	-	29200	23300
Farmer 2	0.4	1	2500	30	75000	1875	625	4500	6250	4125	4500	7500	-	29375	45625
Farmer 3	0.4	1	2500	30	75000	1875	450	4500	6250	4125	4500	7500	-	29200	45800
<b>Total</b>	1.2	3	6750	90	202500	5625	1525	13500	18750	12375	13500	22500	-	87775	114725
<b>Average</b>	0.4	1	2250	30	67500	1875	508.3	4500	6250	4125	4500	7500	-	29258	38242
<b>BC Ratio</b>														<b>1.30</b>	
<b>2. Maize + Pigeonpea</b>															
<b>3. Maize</b>	0.4	17.5	7500	8	60000	2800	3000	4500	3750	2500	3000	7500	7500	34550	25450
<b>BC Ratio</b>														<b>0.73</b>	
<b>4. Pigeon pea</b>	0.4	5	1250	35	43750	600	625	-	-	-	-	7500	7500	16225	27525
<b>BC Ratio</b>														<b>1.69</b>	
<b>5. Paddy</b>	0.4	30	2100	20	42000	1375	5000	1000	1250	2250	2500	1500	1500	16375	25625
<b>BC Ratio</b>														<b>1.56</b>	
<b>6. Cucumber</b>	0.4	0.62	6250	5	31250	500	300	2500	1250	875	750	2700	-	8875	22375
<b>BC Ratio</b>														<b>2.52</b>	
<b>7. Tomato</b>	0.4	0.15	5000	6	30000	5000	300	3000	2750	6250	6250	2000	-	25550	4450
<b>BC Ratio</b>														<b>0.18</b>	
<b>8. Marigold</b>	0.4	2.5	1250	50	62500	2500	5000	4500	1250	12500	8750	3750	-	38250	24250
<b>BC Ratio</b>														<b>0.63</b>	

Note: USD 1 = Rs 45.01

#### 4.4 Resources as Determinants of Participation

The dearth in household resources at women’s disposal does not only mean economic uncertainty. It has also varied and complex effects on their participation. Few of the case stories examined show women are embedded in their social network through which they draw upon support. Support system is an outcome and determinant of broad social processes. An insight on the support system of women can be a black box that can shed light on the impact of interventions. Following Smith’s (1989) methodology, looking at the state of livelihood pursuits of women’s domestic and agricultural enterprises not only reveals linkages (relationships) but also elements of sustainability of livelihood initiatives.

The transformation of Kothapally attributes much of its improved socio-economic situation to a number of actors. Women’s role and their social network are central in the implementation of the various watershed interventions and in the functioning of their households. Women, in situations of slack resources (physical and knowledge), developed strategies to overcome these.

Case studies revealed that relationships build on trust can be the greatest resource of an individual.

'I am trustworthy ... and this trait enabled me to have a sustainable livelihood' said Venkatamma. The trust developed with few households enabled favors like higher wage, payments in kind, and soft loans. Unpaid extra hours of work or attending to personal requests like cleaning or helping during festivals are her ways to reciprocate good deeds and relations. She considered the trust crafted with her sources of livelihood (ICRISAT, DWACRA and other households) as her greatest resources (see Figure 1). Her utmost concern for her DWACRA group is to earn and save which explains her zeal to ensure that all members attend regular meetings and take their obligations seriously for them to be sustainable and have access to bigger loans.

Her livestock resources include 4 buffaloes and 8 goats. These are equally important because these provide the household five liters of milk daily of which 4 liters are sold (US\$ 0.44/ liter) and 1 liter for home consumption. She drew upon her livestock assets; sold 5 heads of goats (US\$ 44.4 each) to pay her daughter's debt.

She was well entrenched with the ideals of community watershed and immediately came forward to participate. She took initiative by attending meetings, joining other women, and engaging conversations with ICRISAT staff and local leaders. This led to acquisition of a new livelihood skill, enhancement of network, and trainer to other women, which significantly improved her self-esteem.

Another case respondent, a wife of a local leader oversees their farm together with four regular trusted laborers (1, 2, 3, and 4) who worked extended hours in her farm and home when needed (see Figure 2). Her successful farming provided for the grain requirement of her two children (A and B) and a sister (C). Having the lead role in their farm disinterested her from joining any SHGs though she believes that SHGs are good venues for women to build their own resources and eventually boost their self-esteem.

Of her four laborers, three are women. Each is given an area to cultivate covered by a verbal sharing arrangement, dutifully honored by the parties, which implies the preservation of relationships. Paid work was remunerated at the rate of US\$ 1.3/day and treatment like they are household members. This has been the way for 30 years and the only obligation of the laborers is to work with sincerity and honesty. Reciprocity and trust are the foundations of their relationships, which enabled the parties to value favors especially among laborers who are able to solicit from their patron all sorts of assistance like old clothes, soft loans for school fees, and rice.

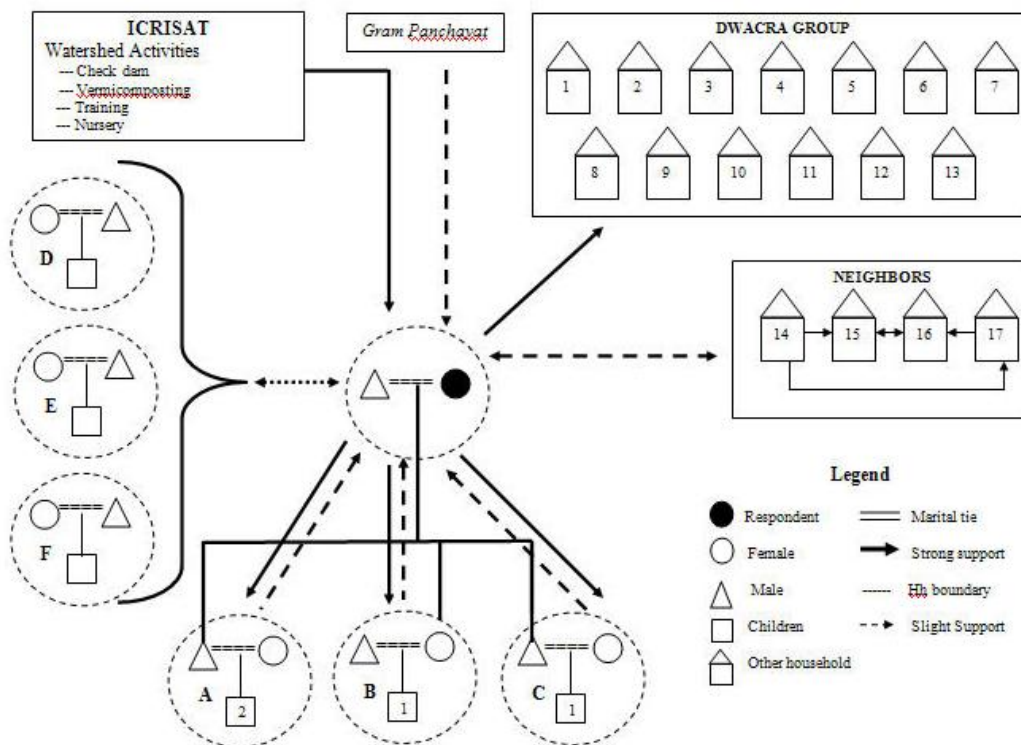


Figure 1: Support system of Venkatamma



The profound role of the availability of resources at the recipient and donor's side is critical in the preservation of relationships. Inequalities of wealth can be a source of alienation in receiving or accepting material assistance. For the four laborers, they may not be able to reciprocate the same way their patron does, however, different forms of reciprocation does happen which implies that social relationships become differentiated within (Mula, 2000).

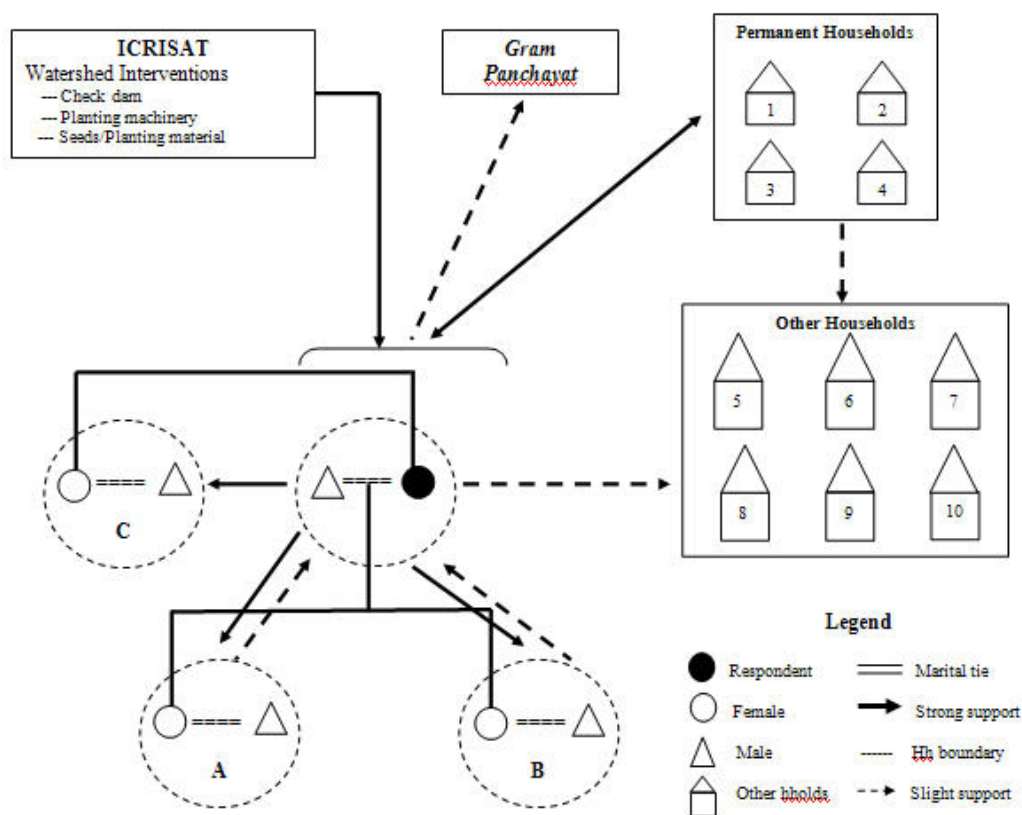


Figure 2: Support system of Bhagyamma

Many projects have dedicated resources for women's concern. The ICRISAT-led watershed project is one case that brought about positive impact to women's agricultural livelihood activities and improvement in yield (i.e. paddy of about 1 hectare: 2500 kg from 1200-1500 kg and cotton of about 0.4 hectare: 1000 kg from 600 kg). However, other aspects have to be considered like understanding of the value chains of agricultural commodities like inclusiveness (to bring small and subsistence growers to being market-oriented or into commercial farming).

Jackson (1999) and Buchy and Rai (2009) also suggested the need to elicit and define the terms of women's involvement like how women become involved and how they are transformed. The inability of resource-poor farmers (including women) to access information, markets, and their weak purchasing power if left unresolved, could not advance development (Spielman 2008). In this study, women's ties are limited to their own group, which is hardly linked with any other agents or institutions. Kothapally women are in an advantage position because of the link they have with ICRISAT although this is still limited.

The quality of the resource is another factor for ensuring sustained involvement of women. Meaningful participation is anticipated not only because of cash benefit but also when they are capacitated to decide and not as passive participants (as mere 'doers' of the technology). Taking the case of a successful SHG, the key is in the transparency of management choices and decisions. In one case, the women leader made sure that all members are informed and that sanctions are decided together. The way women perceive their roles and rights in the group management process is very important. When this happens, significant improvement in relations (even gender relations) follows.

## 5. CONCLUSION AND RECOMMENDATIONS

Several assessments of the Kothapally watershed have been done and the major impact was the change in the biophysical character of key agricultural resources. There were vignettes of social impact including women that can be directly attributed to the various watershed interventions. But in this study, the impacts on women are profound and are summarized below:

- *Participation through access and expanded choice.* The different watershed interventions provided the platform for greater women's participation. Through training, women had access to improved and new livelihood activities that changed traditional domains of agricultural management and operations. A key element in their social preparation is heeding to women's concern and needs which proved to be a favorable driver for their inclusion. Equal amount of effort to understand the social milieu within which interventions are implemented also proved to be advantageous in drawing support from the community.
- *Enhancement of social networks and institutional links.* ICRISAT is a major component of their social network. Women's social networks play a critical role as they maneuver in a changing situation like the introduction of a technology. In all the case studies, social networks have been their largest resource for maintaining livelihood, availing new opportunities for collective action and other prospects for economic activities which conform to the study by Swift (1989). As Harris (1990) argues, relationships emerge not from the universal existence of social entities (groups and institutions) but from universal attributes of social structures like power and control of resources. Social relations are important for understanding the dynamics of support, managing risks, and decision-making processes. The support system of women reveals that the degree and nature of support are defined by whatever inputs invested in a relationship. A network of relationships exists but this does not necessarily mean one can always have access to it. In Kothapally, when respondents were asked to enumerate their sources of support, the names of ICRISAT technicians (and not the institution) who visit them regularly were among those mentioned. The profound role of trust and reliability in the relationship is important to gain the respect of a person.

The cases illustrate that social networks assume the function of information dissemination, generation of advice, access to material resources, and have emotional support function (Chamala 1996, Carey 1988a). Moreover, case studies show women's capability to define their own interests.

Alongside with the positive contributions of watershed initiatives to women in Kothapally, its research for development (R4D) framework needs to pay attention to few niches that can make more profound impact. ICRISAT has deliberately paid attention to gender issues in its R4D works and learned that stress should be made on the development of a framework for the inclusion of women's domains with respect to spaces, interests and resources. As gleaned from this study sensitivity to the following is required:

- *Gender Asymmetry.* Working on crops that are pro-poor remains as strong as ever for ICRISAT. This implies a major playing field for women because these are the crops essential to households' nutritional and livelihood security. Women have immense contribution not only in subsistence economies but also in low external input agricultural systems. The seasonality of rainfall, which has become more erratic in recent years, increasingly creates havoc to agricultural activities and compounds the situation of women. This exacerbates the so called 'double burden' that inevitably results in gender asymmetry among farming households. This is because women do more in combined agricultural and domestic production. Having said this, the need for sincere incorporation of gender to address inequality especially in the current scenario of environmental uncertainty is needed. Harnessing women's participation should have strong elements of capacity building and service complementation (including flow of support) for their social organization and strengthened resilience.

In the institutional architecture of any R4D community watershed engagements, one of the ways to streamline direct support for women empowerment is having explicit programs with flexible financing mechanisms. Women will achieve a higher degree of success when they have resources at their disposal to fulfill the priorities and needs of their own domains.

- *Sustainable Production System.* Watershed initiatives in Kothapally were initially meant to improve biophysical resources that could enhance incomes of households. It is apparent that women got benefited; however, some of the livelihood interventions they engaged in were short-lived as there was no market and difficulty in maintenance. The latter was more of an issue of the participants' unwillingness to provide little investment. While livelihood framework which is based on the concept of limited resources, competing needs and priorities was not the main concern of the watershed project, this should be part of the long term strategy. There is also the competing view regarding ICRISAT's role in Kothapally watershed. Respondents were of the stance that ICRISAT should continue to support the watershed interventions. This indicates a weak phasing-out stage. Over dependency to ICRISAT for activities that can be done by them or the community need to be instilled as part of their commitment.
- *Spill over.* Adopting a strategic site to showcase technologies where farmers are key actors to their management is anticipated to spark awareness, then adoption from within, and eventually, spill over which are in accordance to Alston (2002). The aggregate state or national agricultural productivity of about half or more of the total measured productivity growth and corresponding research benefits are attributed to R&D spill overs.

It was found that minimal spillover of the watershed interventions in an adjoining village (i.e. Urella) happened not only because of the similarity in ecology and agricultural activities but largely due to influence of the respondents' social network. This conforms to Bandeira and Rasul (2006), Conley and Udrey (2000), and Foster and Rozenweig (1995) studies where the influence of actors such as salesmen, neighbors, and co farmers in farmers' social networks are key towards successful spill overs.

Harnessing better spill overs through deliberate strategies must be an integral part of watershed agenda. While there are cases of technology spill overs that happen without 'push' from outside entities like government institutions and R&D organizations, institutional arrangement is essential such that it should involve local and traditional societies. ICRISAT being a strong advocate of partnership with so much success stories to its claim can translate the principles and lessons learned from capacity building initiatives to guarantee spill over and even sustainability.

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